Title: NONVOLATILE DATA STORAGE CIRCUIT USING FERROELECTRIC CAPACITORS
Inventor: YOKOZEKI, et al.
Application No. Unknown
Docket No. 108066-00098

FIG. 1

PRIOR ART

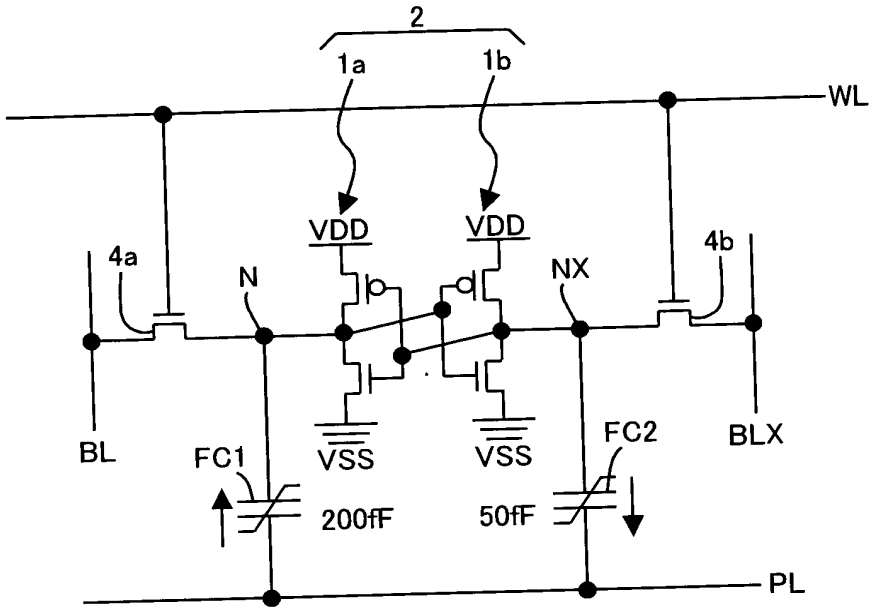


FIG. 2

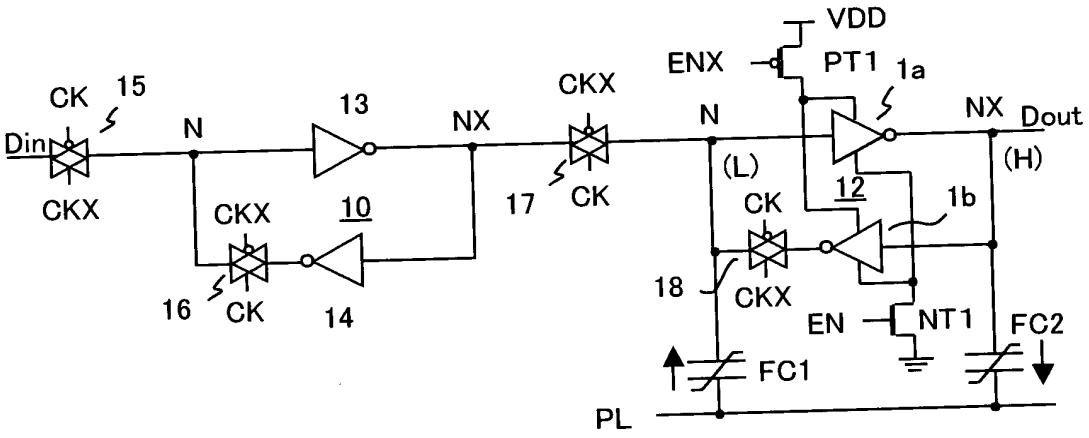


FIG. 3

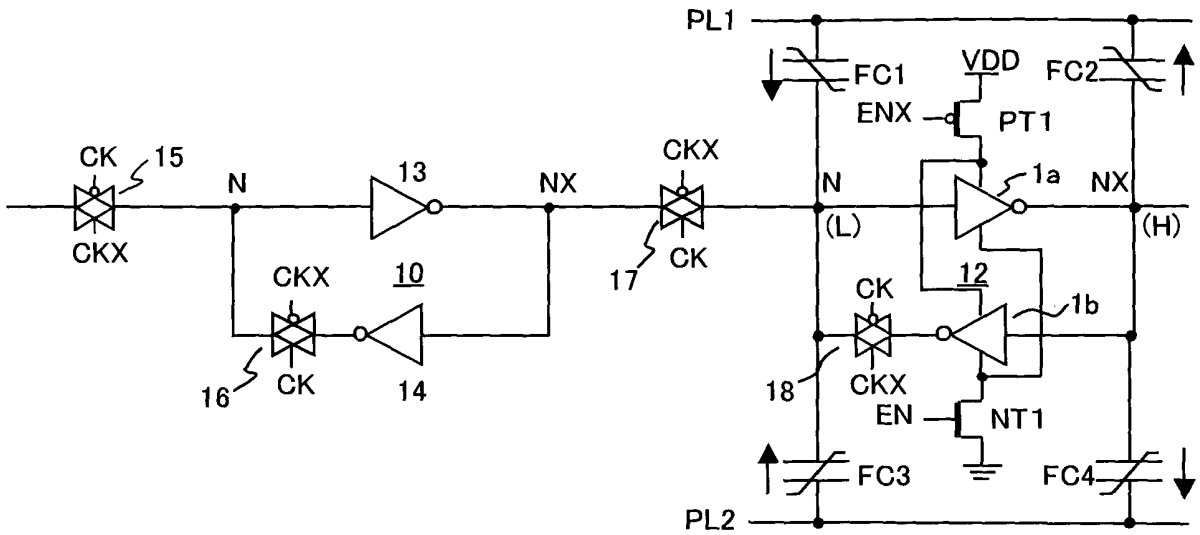

PL1
FC1
VDD
FC2
ENX
PT1
CK
15
CKX
N
13
NX
CKX
N
1a
NX
(L)
(H)
17
CK
CKX
10
CK
12
1b
16
CK
14
18
CKX
EN
NT1
FC3
FC4
PL2

FIG. 4

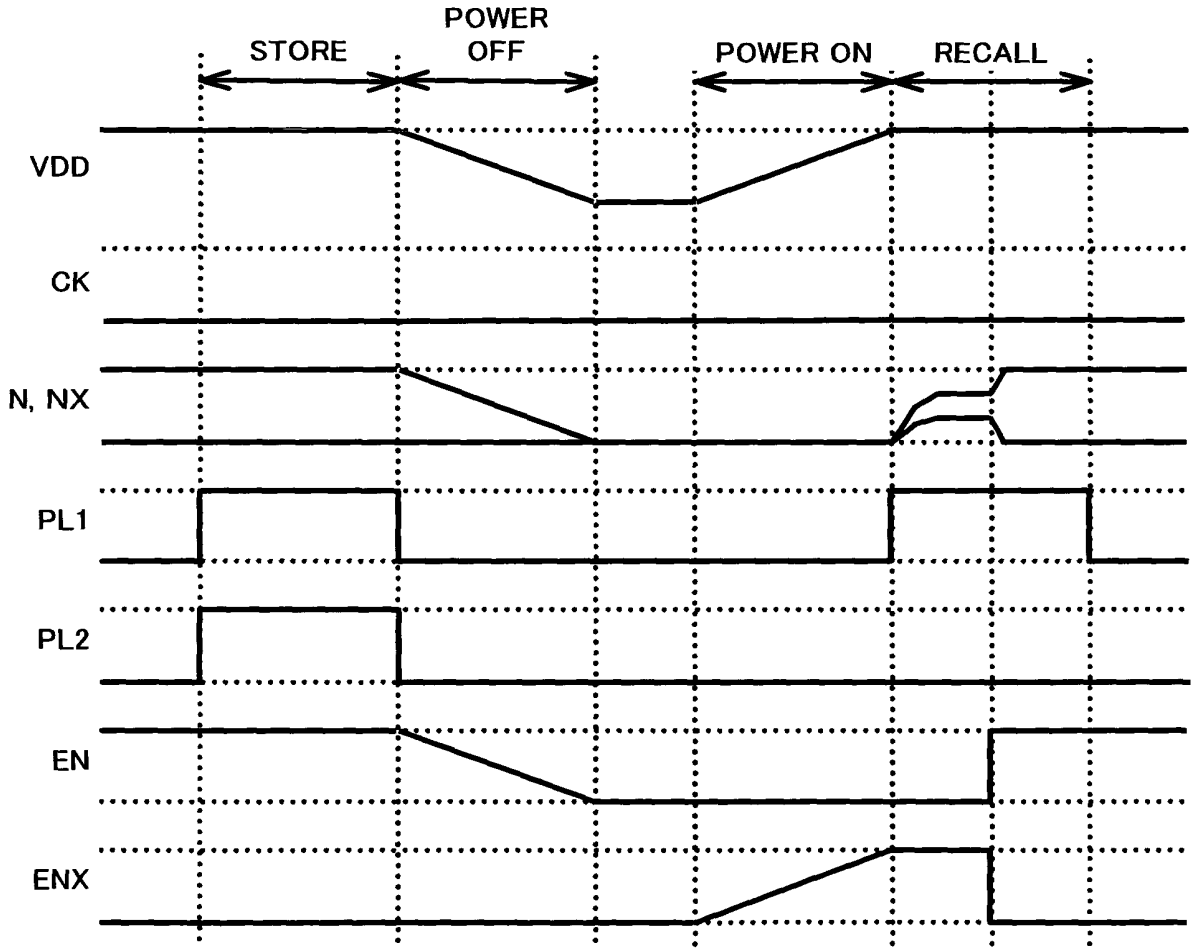

STORE
POWER OFF
POWER ON
RECALL
VDD
CK
N, NX
PL1
PL2
EN
ENX

FIG. 5

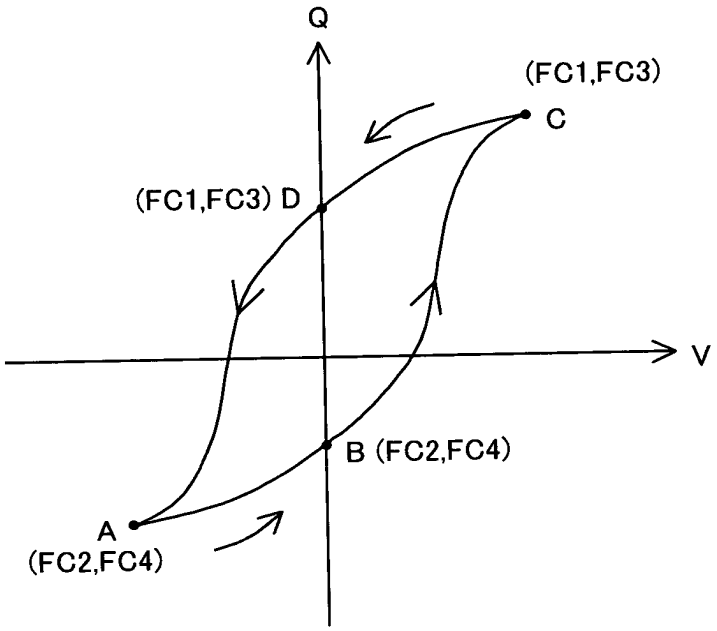

Q
(FC1,FC3)
C
(FC1,FC3) D
V
B (FC2,FC4)
A
(FC2,FC4)

FIG. 6

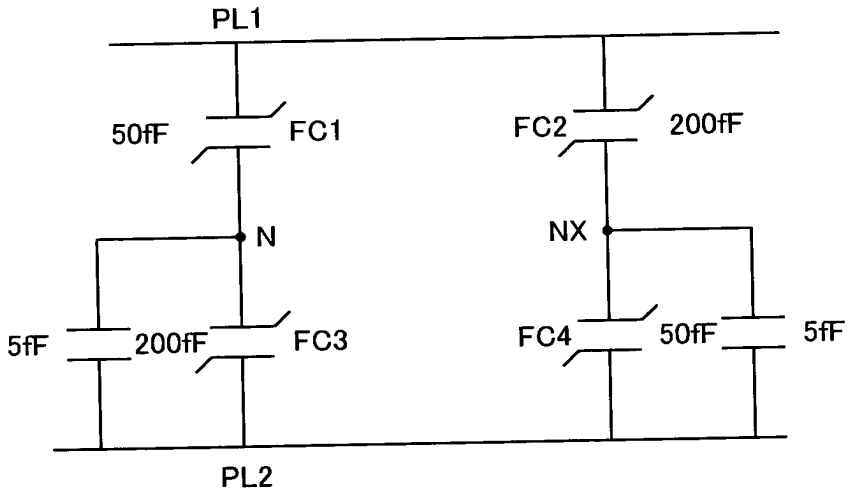

PL1
50fF
FC1
FC2
200fF
N
NX
5fF
200fF
FC3
FC4
50fF
5fF
PL2

FIG. 7A

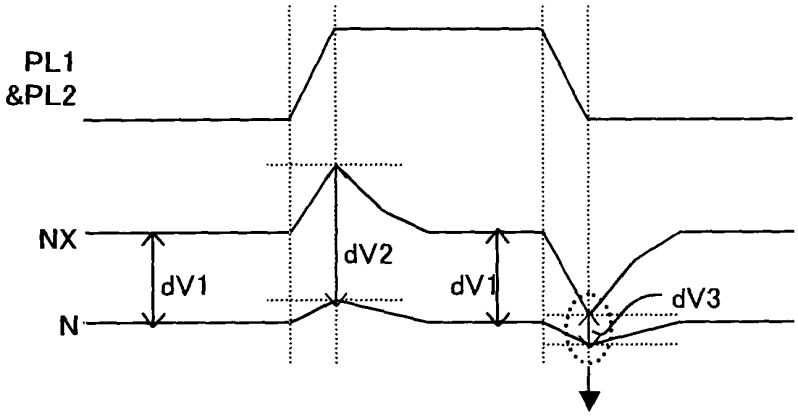


FIG. 7B

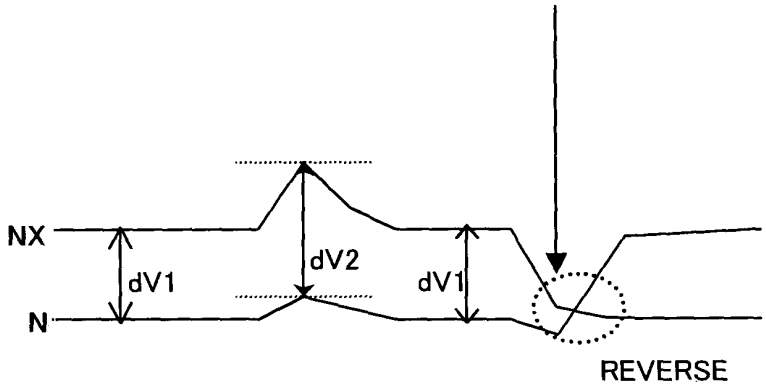


FIG. 8

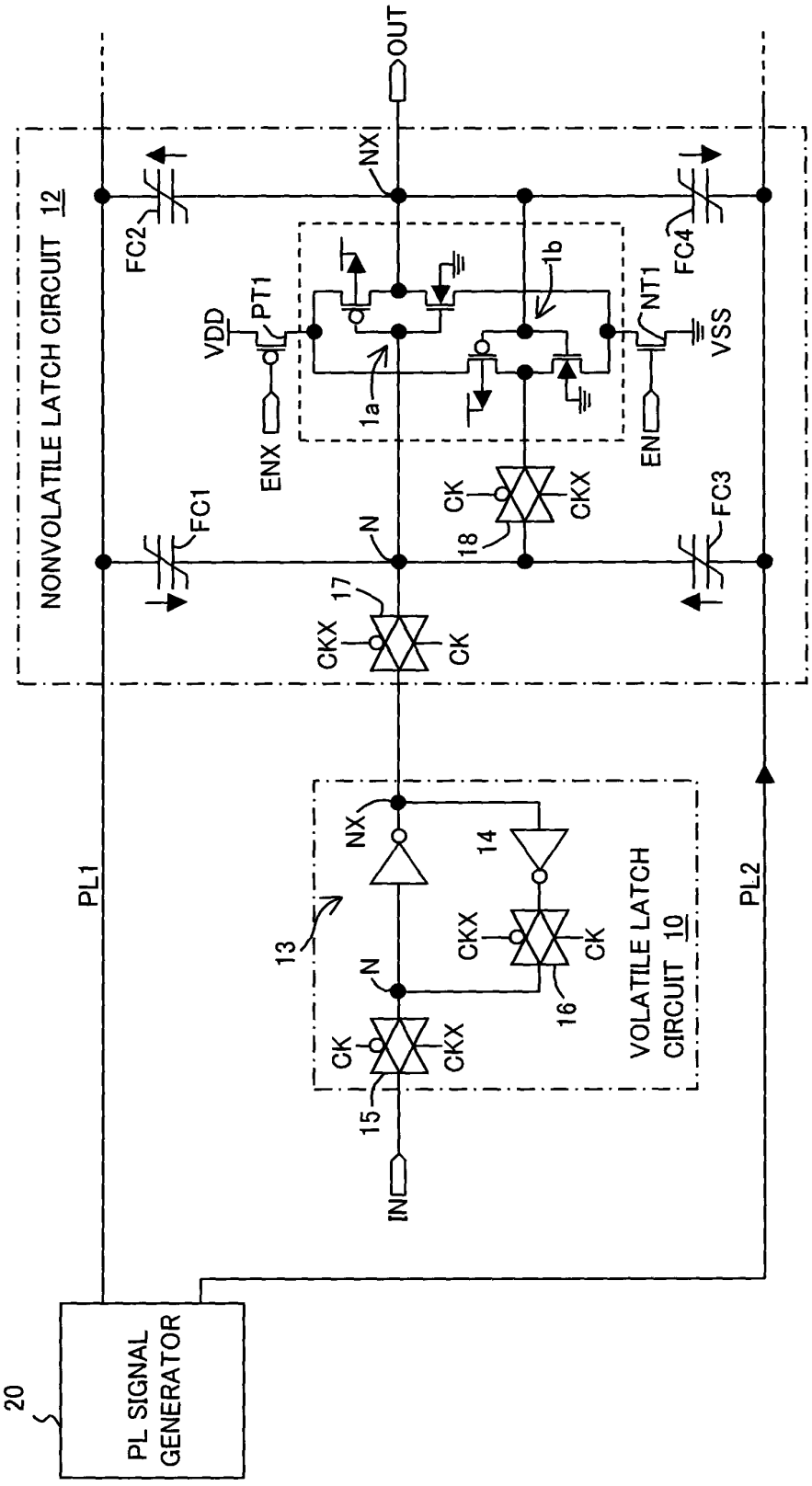
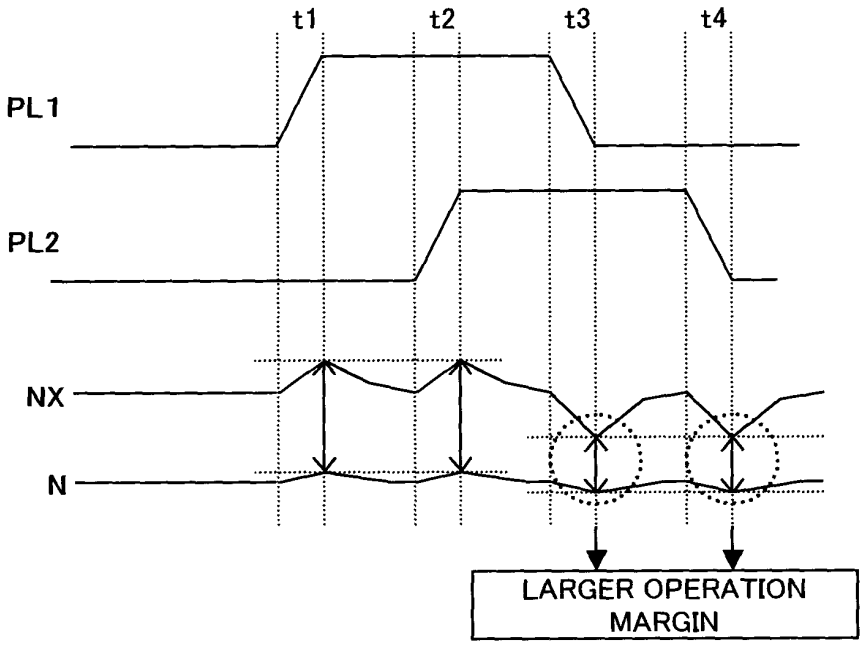

OUT
NX
NONVOLATILE LATCH CIRCUIT 12
FC2
FC4
VDD
PT1
NT1
VSS
1b
1a
ENX
EN
CK
CKX
18
FC1
FC3
N
17
CKX
CK
PL1
PL2
13
14
16
15
IN
VOLATILE LATCH CIRCUIT 10
20
PL SIGNAL GENERATOR

FIG. 9



FIRST EXAMPLE

FIG. 10

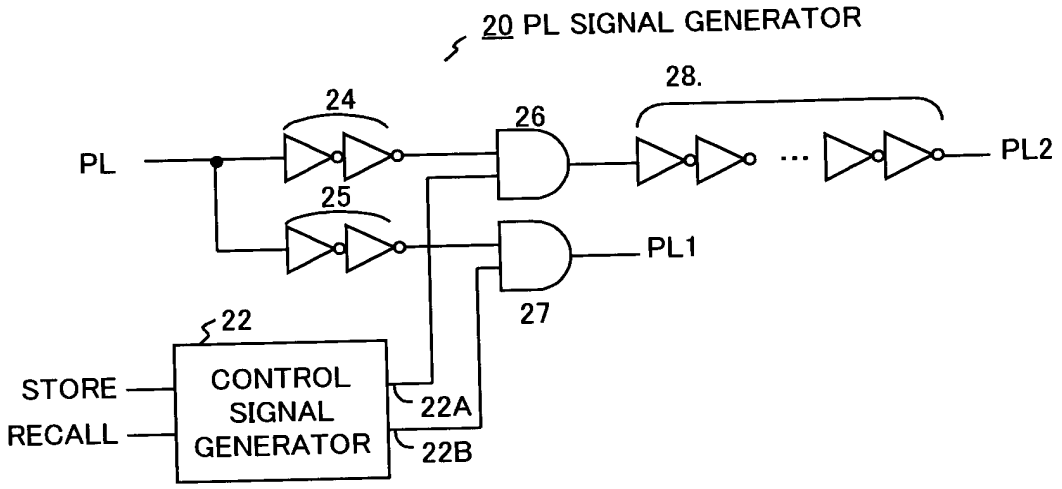

20 PL SIGNAL GENERATOR
24
26
28.
PL
PL2
25
PL1
27
22
STORE
RECALL
CONTROL SIGNAL GENERATOR
22A
22B

FIG. 11

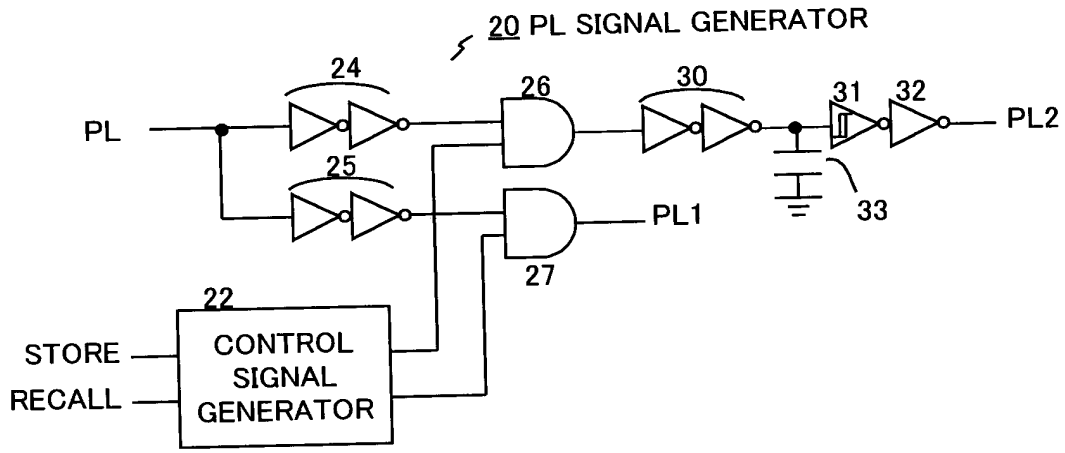
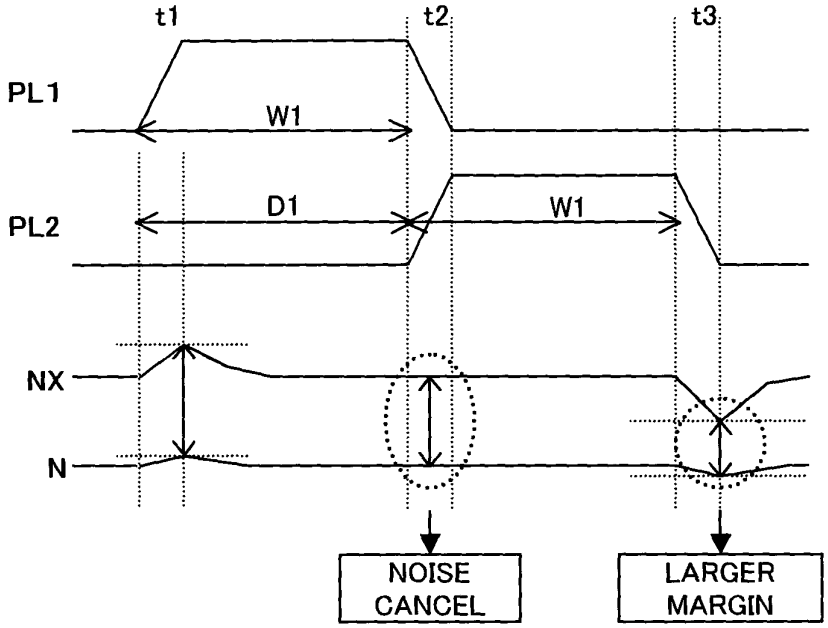

20 PL SIGNAL GENERATOR
24
26
30
31
32
PL
PL2
25
PL1
33
27
22
STORE
RECALL
CONTROL SIGNAL GENERATOR

FIG. 12



SECOND EXAMPLE

FIG. 13

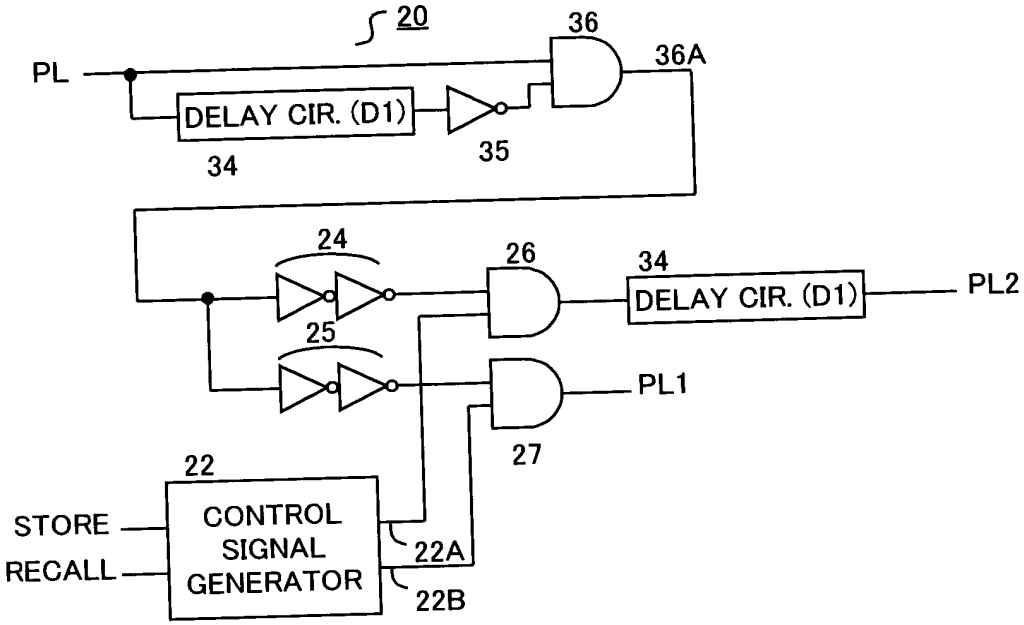

20
36
36A
PL
DELAY CIR. (D1)
34
35
24
26
34
DELAY CIR. (D1)
PL2
25
PL1
27
22
STORE
RECALL
CONTROL
SIGNAL
GENERATOR
22A
22B

FIG. 14

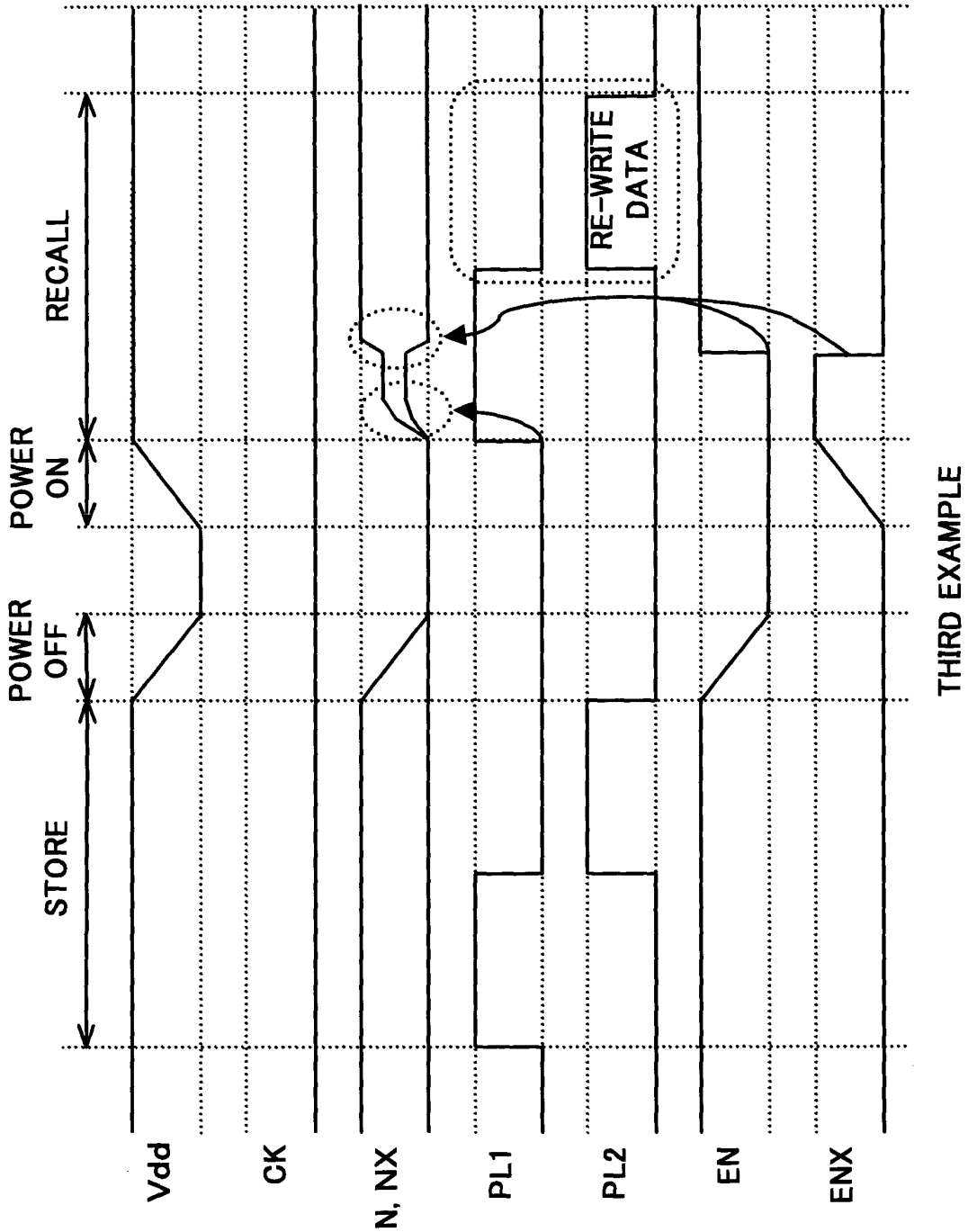
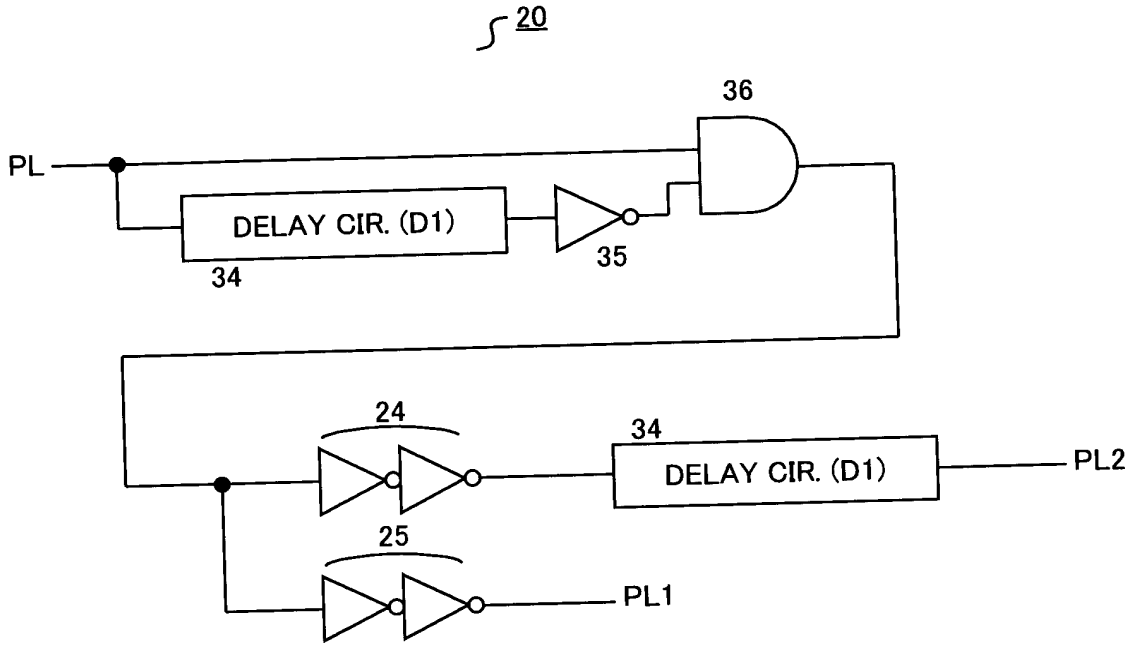

STORE
POWER OFF
POWER ON
RECALL
RE-WRITE DATA
Vdd
CK
N, NX
PL1
PL2
EN
ENX
THIRD EXAMPLE

FIG. 15



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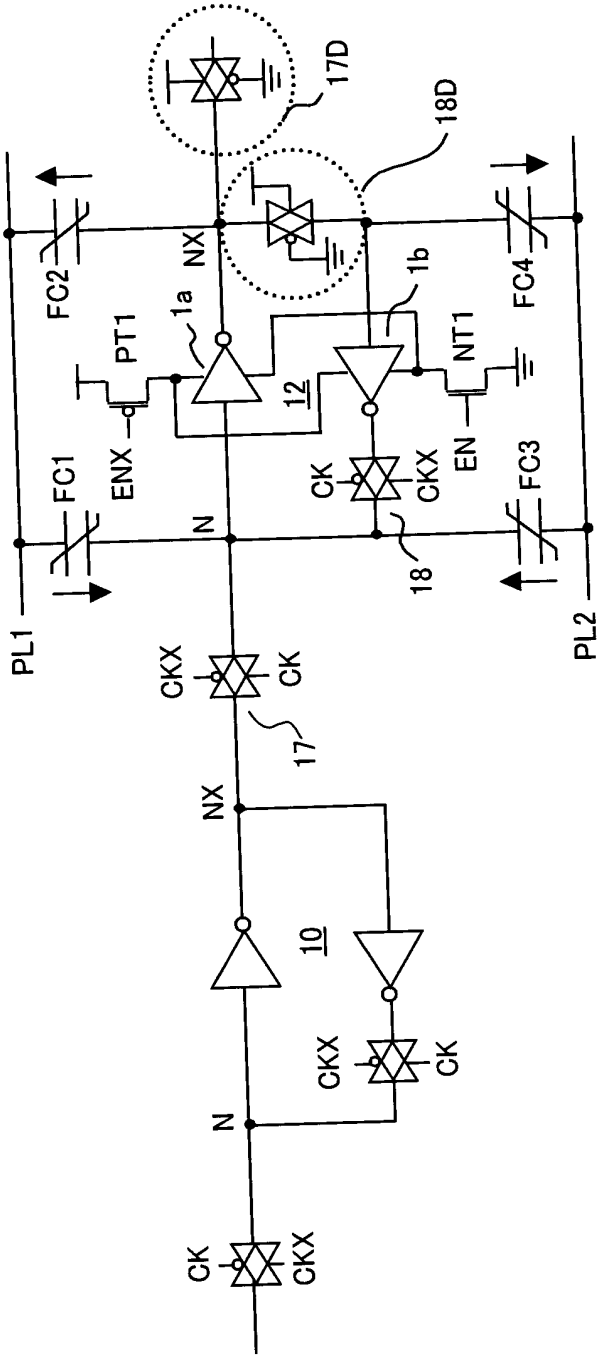
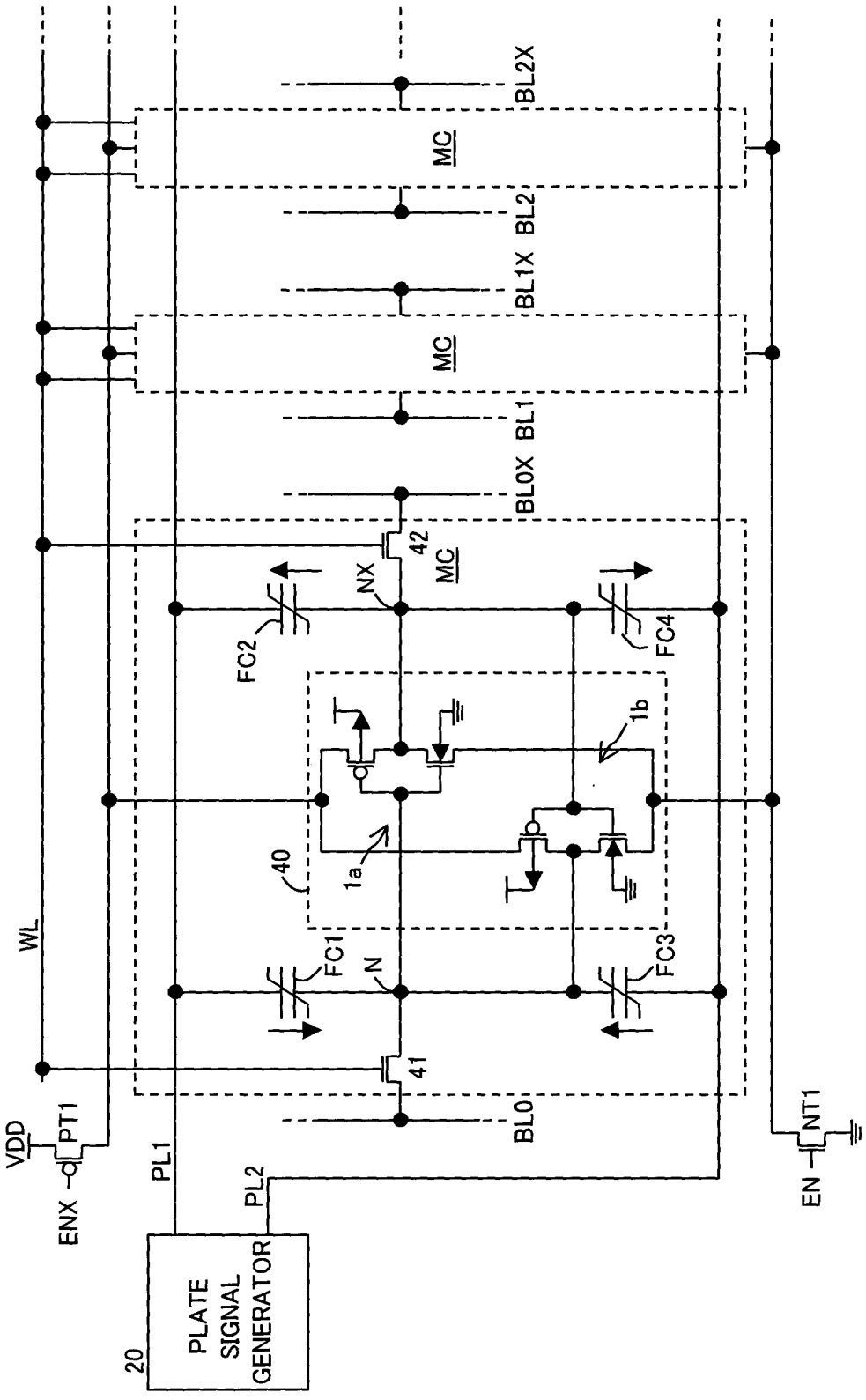


FIG. 16

FIG. 17


MEMORY CIRCUIT EXAMPLE
BL2X
MC
BL2
BL1X
MC
BL1
BL0X
42
MC
NX
FC2
FC4
1b
40
1a
WL
FC1
N
FC3
41
BL0
VDD
PT1
ENX
PL1
PL2
20
PLATE SIGNAL GENERATOR
NT1
EN